Computer Graphics is no separate from Mathematics!

$\mathcal{I}$am: _____

Roll: _____   Date: _____

My Full Signature:

1. Express transformation matrices for reflection of a point about any straight line **y=mx+c**   _Check and Tally:_ $\begin{bmatrix} cos\,2\theta & sin2\theta & -c\,sin2\theta \\ sin2\theta & -cos\,2\theta & c(1+cos\,2\theta) \\ 0 & 0 & 1 \end{bmatrix}$ **where**θ=tan^{-1} **(m)**

2. A mirror is placed on X-Y plane such that it passes through the points (**2**,**0**) and (**0**,**2**). What will be the vertices of ΔABC after reflection? $\Delta ABC \equiv \begin{pmatrix} 5 & 5 \\ 3 & 4 \\ 4 & 7 \end{pmatrix}$

   [Check and Tally: Answer should be (-2, -1), (-3, -3), (-5, -2)]

3. Following transformations are applied to ΔABC in sequence:

   i. Reflection about the **X-axis**

   ii. Reflection about the straight line **y=-x** $\Delta ABC \equiv \begin{pmatrix} 8 & 2 \\ 10 & 4 \\ 8 & 6 \end{pmatrix}$

   iii. Rotation about the origin by **270°**

   Find an equivalent single Transformation matrix combining the above 3 transformations. Finally, what do you conclude?

   [Check and Tally: "I will not tell you beforehand!"]

4. Perform viewport transformation of the rectangle ABCD to a viewport whose lower left is at the point A and is the entire _normalized_ screen. $ABCD \equiv \begin{pmatrix} 2 & 2 \\ 10 & 6 \\ 8 & 10 \\ 0 & 6 \end{pmatrix}$

   [Check and Tally: $\begin{bmatrix} 0.10 & -0.10 & 0 \\ 0.05 & 0.20 & 0 \\ 0.85 & 1.8 & 1 \end{bmatrix}$ _]_